Space Weather Forecast

Issued on Saturday, 21 May 2022 at 13:03 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Radio Blackouts Likely from Moderate-class X-ray flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was low over the past 24 hours, with the peak X-ray flare being an upper-end common class at 20/2212UTC. This was produced from a relatively innocuous-looking sunspot in the northeast of the sun, with this one of seven numbered sunspot regions at present.

The facing-side roster of sunspot regions remains dominated by a large and complex group in the centre northwest quadrant. This feature is likely to be mature, with only slow changes observed in the form of minor trailing spot development and a slight increase in its area in the 24 hours.

Also of note were a much smaller sunspot group in the northwest, which developed rapidly, only to stall, spread and fade as the UTC day of Saturday 21 May dawned; while in the northeast, a second group saw rapid proliferation of many minor spots. All other groups were relatively stable and unremarkable over the same interval.

A long-duration common-class X-ray flare was seen around 20/1200UTC and is likely to have produced a Coronal Mass Ejection (CME), a feat that may have repeated at 20/2300UTC. There are large imagery gaps at present in triangulating satellite imagery, however analysis of both is pending. At present then, there are no confirmed CMEs with Earth-directed components, but two candidates.

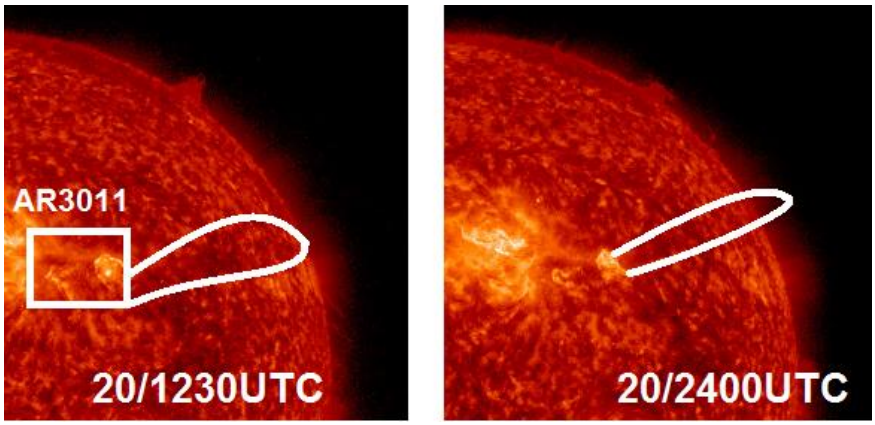

Figure 0: False-colour extreme UV satellite imagery of apparent CME-generating events spawned from a northwestern sunspot group in the period. Analysis of both of these is in course.

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Solar Wind / Geomagnetic Activity: The solar wind was characteristic of a fast wind regime, most likely emanating from a 'coronal hole' in the western solar hemisphere. The solar wind speed initially saw a slight rise to become strong briefly before ebbing away slightly into the UTC morning of Saturday. The number of particles in the solar wind and their associated magnetic field were both more limited in scope throughout. The net result of the above solar wind measures was provisionally quiet geomagnetic activity, well below G1 Minor Storm.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is Likely to be moderate, with a continuing daily slight chance of an isolated Strong-class flare (R3 Radio Blackout). The main source of the activity is likely to be from the largest spot, which remains present throughout the coming four-days on the Earth-facing side.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast, although note that there are up to two candidates undergoing assessment for any Earth-bound component.

Otherwise, the only enhanced geomagnetic activity in the coming four days ought to be from the incumbent fast wind, with this feature likely to have already peaked. Today's slight chance of G1 should fall with time, with reliably quiet geomagnetic conditions expected to be reinstated by the end of the current four days.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with a daily slight chance of reaching S1, should any notable X-ray flares occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	50	50	50	50
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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